



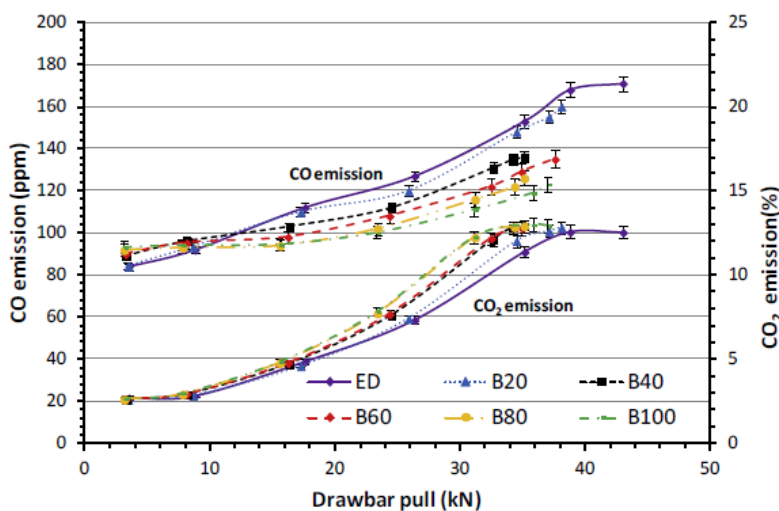
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Influence of biodiesel on the performances of farm tractors: Experimental testing in stationary and non-stationary conditions. *Renewable Energy* 121, 677-687.

Scientific Paper

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This paper demonstrates the results of testing the performance of tractors using fossil diesel, biodiesel, and blends of biodiesel and fossil diesel. The results of tests conducted in stationary and non-stationary conditions indicate that, in contrast to fossil diesel, the use of biodiesel and blends of biodiesel and fossil diesel reduce the power of engine and drawbar power, and increase specific fuel consumption. Thermal efficiency slightly improves with biodiesel blends. The differences become notable with bigger share of biodiesel in the blend. However, the changes are less notable regarding the differences in heating value, which is the result of complete combustion. Use of different fuels, compared to use of fossil diesel only, reduces the CO emission and temperature of exhaust fumes, and increases the CO₂ emission and NO_x. At maximum load, the difference between the parameters measured in stationary and non-stationary conditions is minimal. On the other hand, at lower loads, the load variable formed in non-stationary conditions of testing becomes noticeable which results in greater differences. However, decrease in engine power and increase in fuel consumption using biodiesel significantly deteriorated the exploitation characteristics of plowing tractors (production efficiency was reduced by 12.87% and fuel consumption per unit of cultivated area was increased by up to 21.63%).



The tests performed in stationary and non-stationary conditions indicated that the changes of engine power, DBP and SFC were statistically highly significant when using B20, B40, B60, B80 and B100 fuels compared to ED. The only exception was B20 blend which use did not show statistically significant difference in engine power with respect to ED during the tests performed in stationary conditions.

